

Agency Wide Enterprise GIS for NASA Environmental Management and Remediation



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NASA STENNIS SPACE CENTER ENVIRONMENTAL OFFICE
OFEE FEDERAL AND ENVIRONMENTAL SYMPOSIUM WEST
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Stennis Space Center, MS



America's largest rocket engine test complex where future engines are tested for returning astronauts to the moon and Mars

Tests all Space Shuttle Main Engines, which provide most of the total thrust needed during the shuttle's 8 minute flight to orbit

Home to over 30 government, state private, university resident agencies

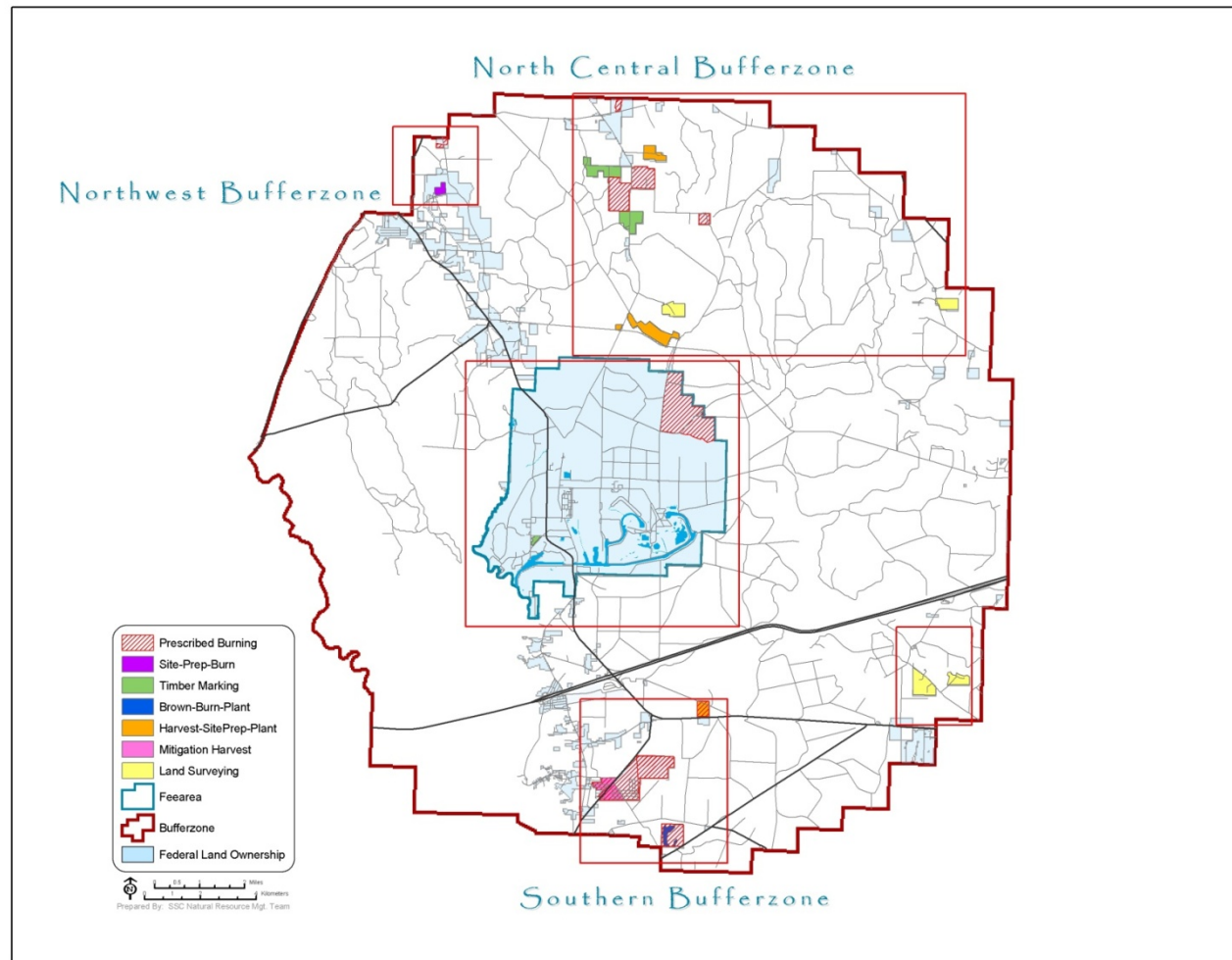
"If you want to go to the moon, you first have to go through Hancock County, Mississippi"



Location



Stennis Buffer Zone



NASA Environmental Management Division



Mission:

- Enable environmentally sound mission success
- Preserve, protect, and enhance natural and cultural resources
- Eliminate environmental incidents, toxic chemical use, hazardous waste and environmental liability

Regulatory Drivers:

- Executive Order 13423 - Strengthening Environment, Energy and Transportation
- Executive Order 13148 – Greening the Government
- Clean Air Act
- Clean Water Act
- National Historic Preservation Act
- Endangered Species Act

Regulatory Compliance:

- NEPA
- CERCLA/RCRA



Impacts

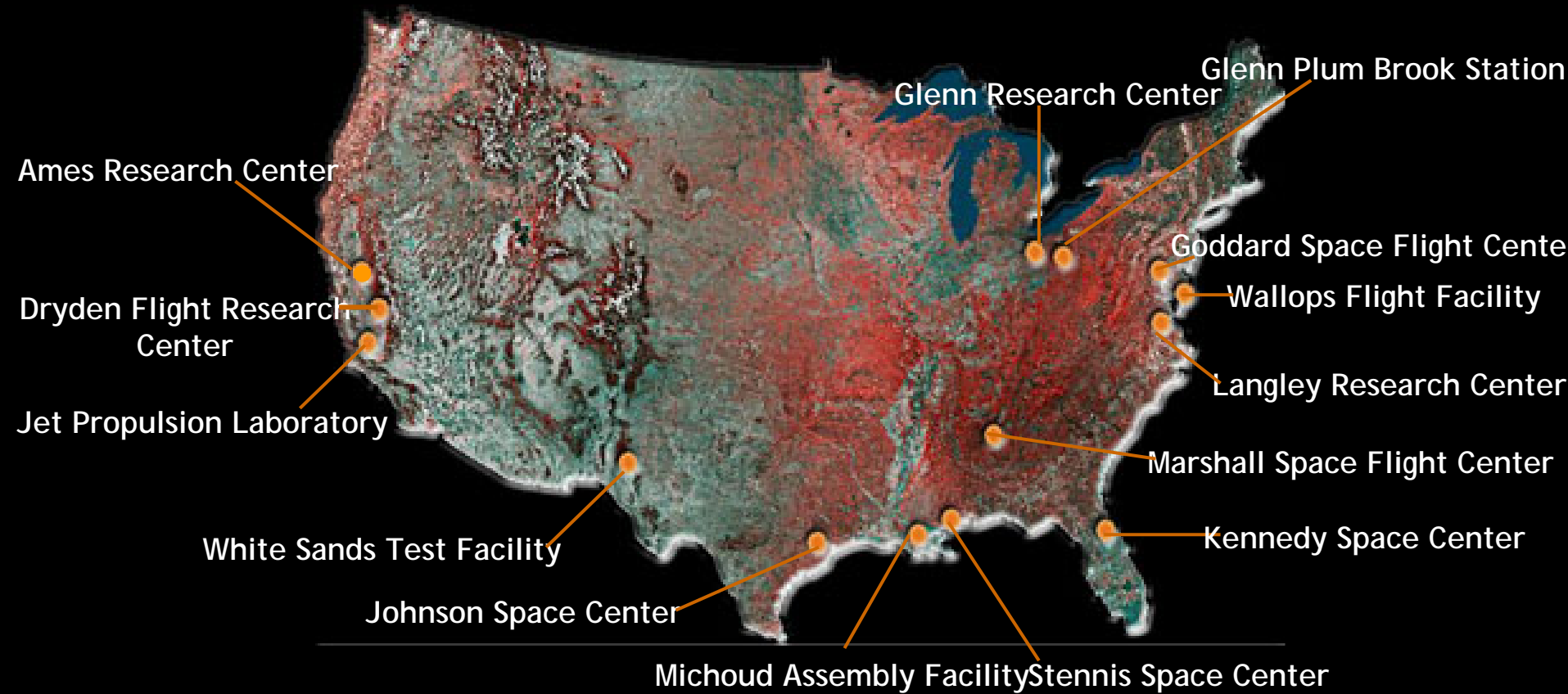


Natural Resources Impacts
Cultural Resource Impacts
Cost/Delay to NASA
Mission Impacts
Safety & Health
Legal & Regulatory
Implications





NASA Field Center Locations



Challenge



Each center is unique and takes a different approach to meeting their EMS requirements

Size of installations

- Land: 150 acres to 125,000 acres
- Population: 1,000 to >10,000 onsite personnel

Complexity of installations

- Laboratories, test stands, wind tunnels, hangars
- Includes tenant organizations, private enterprises
- Large contractor work force

Geographic Variability (10 states) and Ecotypes

- Rural
- Urban/Suburban
- Desert, Wetlands

Strong need for a standard, comprehensive approach to Agency-wide Environmental Management and Reporting



Solution: Headquarters-level Environmental GIS (EGIS) Portal



Standard, agency-wide application that connects NASA HQ to individual Centers Environmental databases for mapping, modeling, analysis, reporting

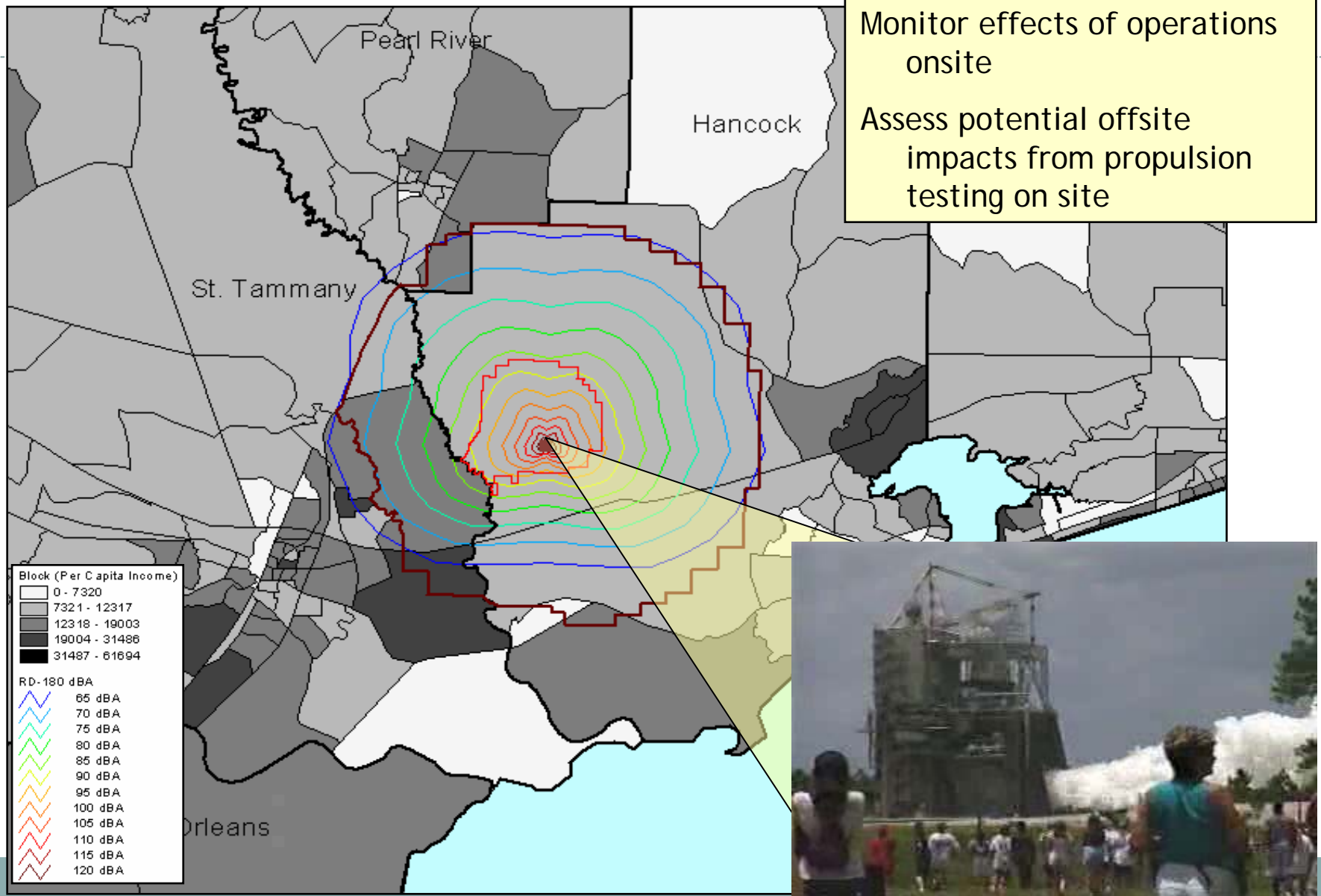
Serves as the foundation for advanced applications development

Allow HQ managers to efficiently visualize and understand environmental landscape

Web-based, no specialized software required, user-friendly

Supports Environmental *and* Facilities Divisions

EGIS History: Stennis Space Center, Bay St. Louis, MS





Standard Data Layers

Hydrology

Represents the classification and use of surface and subsurface water

Subsurface

Wells

Surface

Hydrologic Units/Subunits

Water Bodies

Rivers/Streams

Infrastructure

Represents cultural features that support the basic activities of "modern" life.

Transportation

Roads

Railroads

Utilities

Natural Gas Pipelines

Cadastral/Geodetic

Represents the locational information required to define the geographic position of a place or feature

Public Land Survey System (PLSS)

Sections

Subdivisions

Townships

Parcel Boundaries

Referencing System

1:24,000 Quadrangle Grid

1:100,000 Quadrangle Grid

Physical Geography

Represents the conditions reflecting the natural environment

Land Characterization

Land Use

National Wetlands Inventory (NWI)

Q3 Flood

Vertebrate Species Locations

Threatened & Endangered Species Habitats

Physiography

Soils

Surface Geology

Contours

Elevation

Geo-Political

Represents the various boundaries used or defined by federal, state and local units of government

Administrative

State Boundaries

County Boundaries

Census Places

Stennis Space Center Boundaries

Public School District

County Zoning Boundaries

Political

Senate Districts

House of Representatives District

Voting Precincts

Zip Code Boundaries



Standard Data Layers

Socio-Economic

Represents the aspects of human society covering past and current conditions

Census Data

- Block Groups
- Census Tracks
- Census Demographics

Cultural

- Hospitals
- Schools
- Public Colleges and Universities
- Buildings/Parking Lots
- Archaeological Sites

Environmental

- Hydrogen Tanks
- Acoustic Levels

Remote Sensing Data

- Landsat Thematic Mapper (30 Meter)
- Spot (20 Meter)
- Radarsat (12 Meter)
- ATLAS (2.5 Meter)
- Star3i (2.5 Meter; 10 Meter)
- AVIRIS (2 Meter)
- Positive Systems (1 and 3 Meter)
- IKONOS (1 and 4 Meter)

Data Providers & Collaborators

- NASA Center Archive
- US Census Bureau
- US Geological Survey
- FEMA
- Soil Conservation Service
- US Corps of Engineers
- US Fish and Wildlife Service
- Tax Assessor's Office
- Planning Commission
- Coastal Environments, Inc.
- Department of Marine Resources
- Gulf Regional Planning Commission
- Dept of Environmental Quality
- Universities and Colleges

Stennis Environmental GIS Applications



Natural Resource Management

- Wetlands mitigation
- Timber management
- Invasive species control
- Wildlife management
- T&E habitat mapping

Cultural Resource Management

- Historical site preservation
- Archeological mapping

CERCLA Site Remediation

- Data archival
- Groundwater monitoring
- Plume modeling

•Emergency Response/Disaster Preparedness

- Emergency Environmental Response Tool

•Environmental Justice

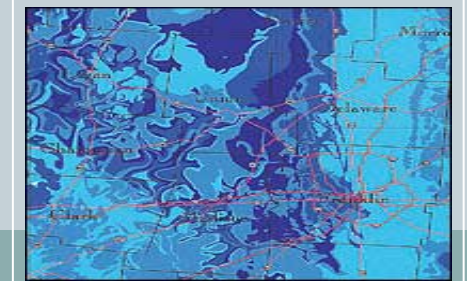
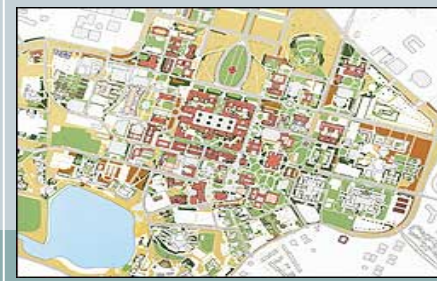
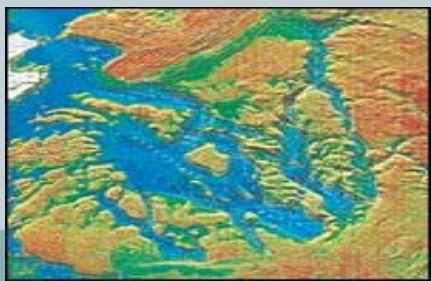
- Noise and Vibration

•Environmental Compliance

- Air Emissions Inventory
- Hazardous Materials Location
- Spill prevention containment countermeasure

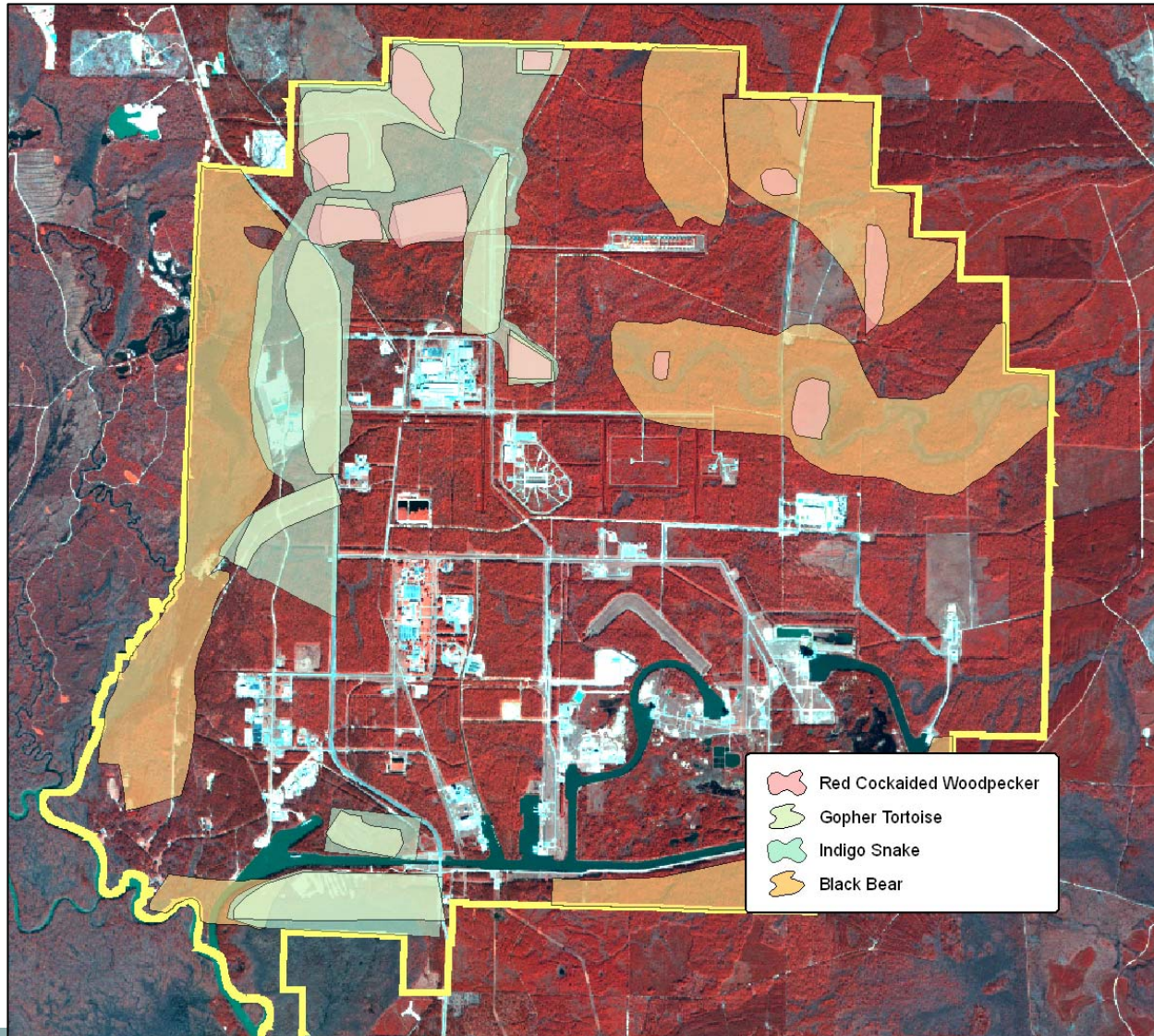
•Facilities Master Planning

- Link to AutoCAD data
- Floorplan integration
- Site-wide GPS



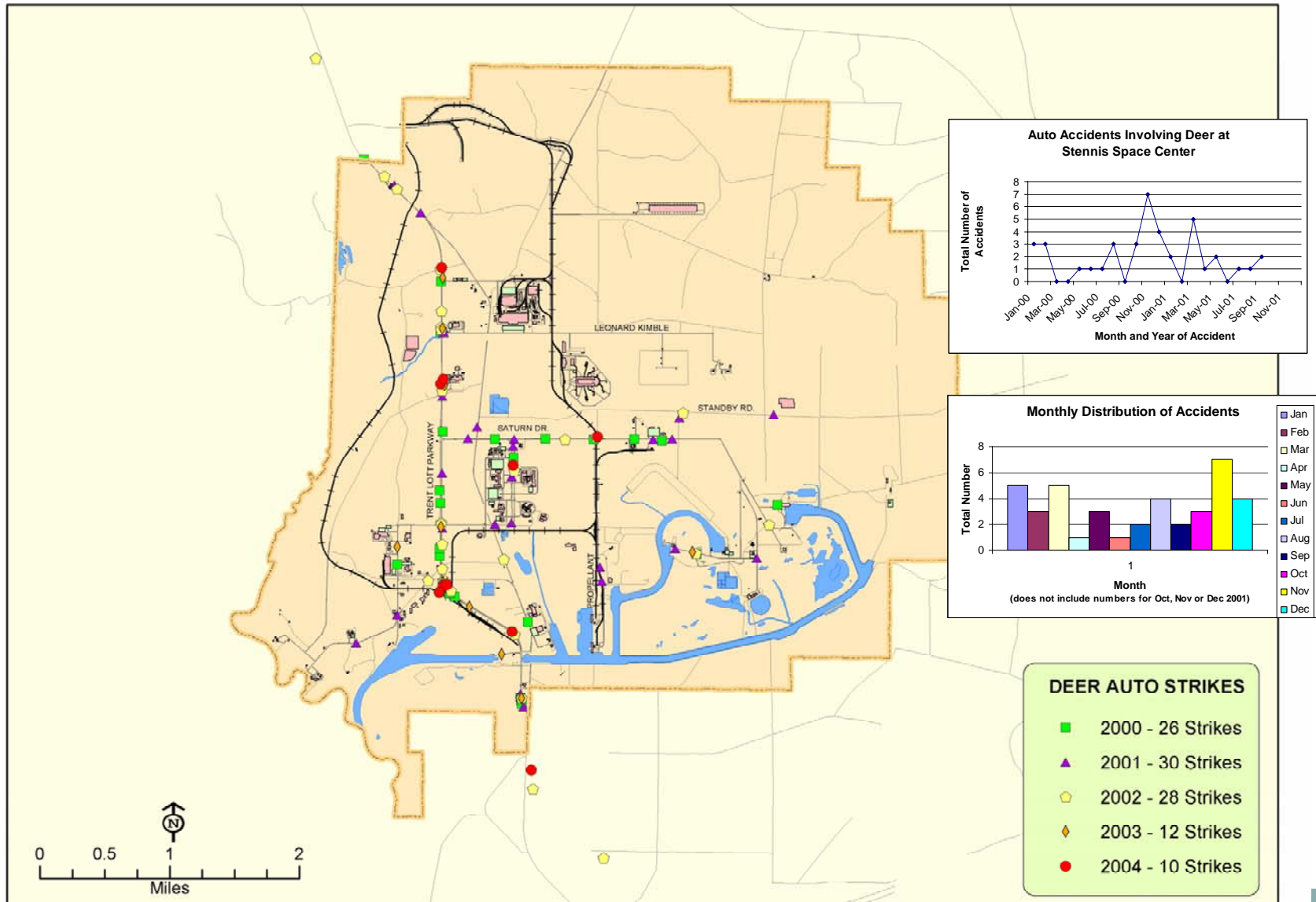


Potential Threatened and Endangered Species Habitat





Wildlife Management Deer-Auto Strikes

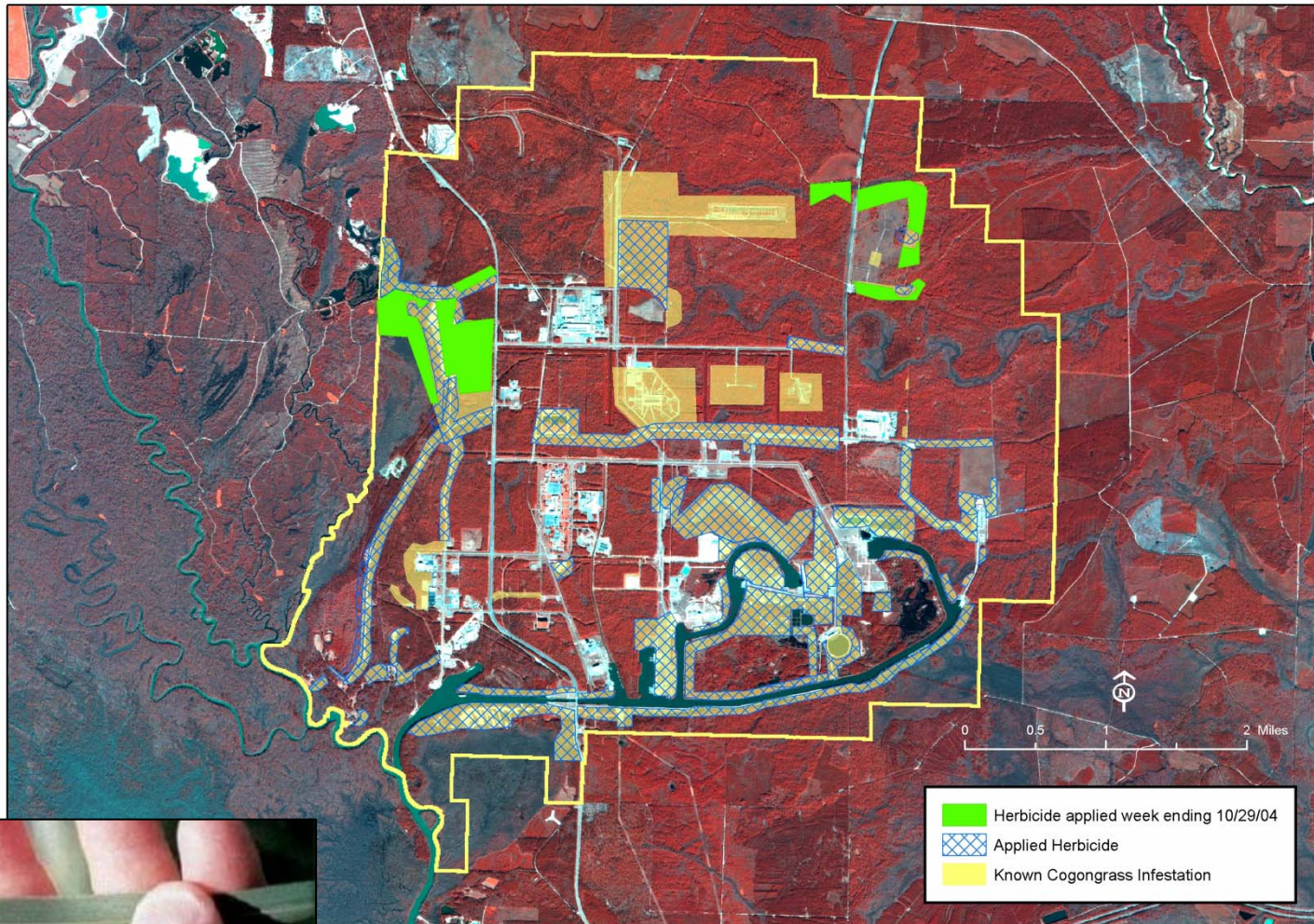




Invasive Species Control

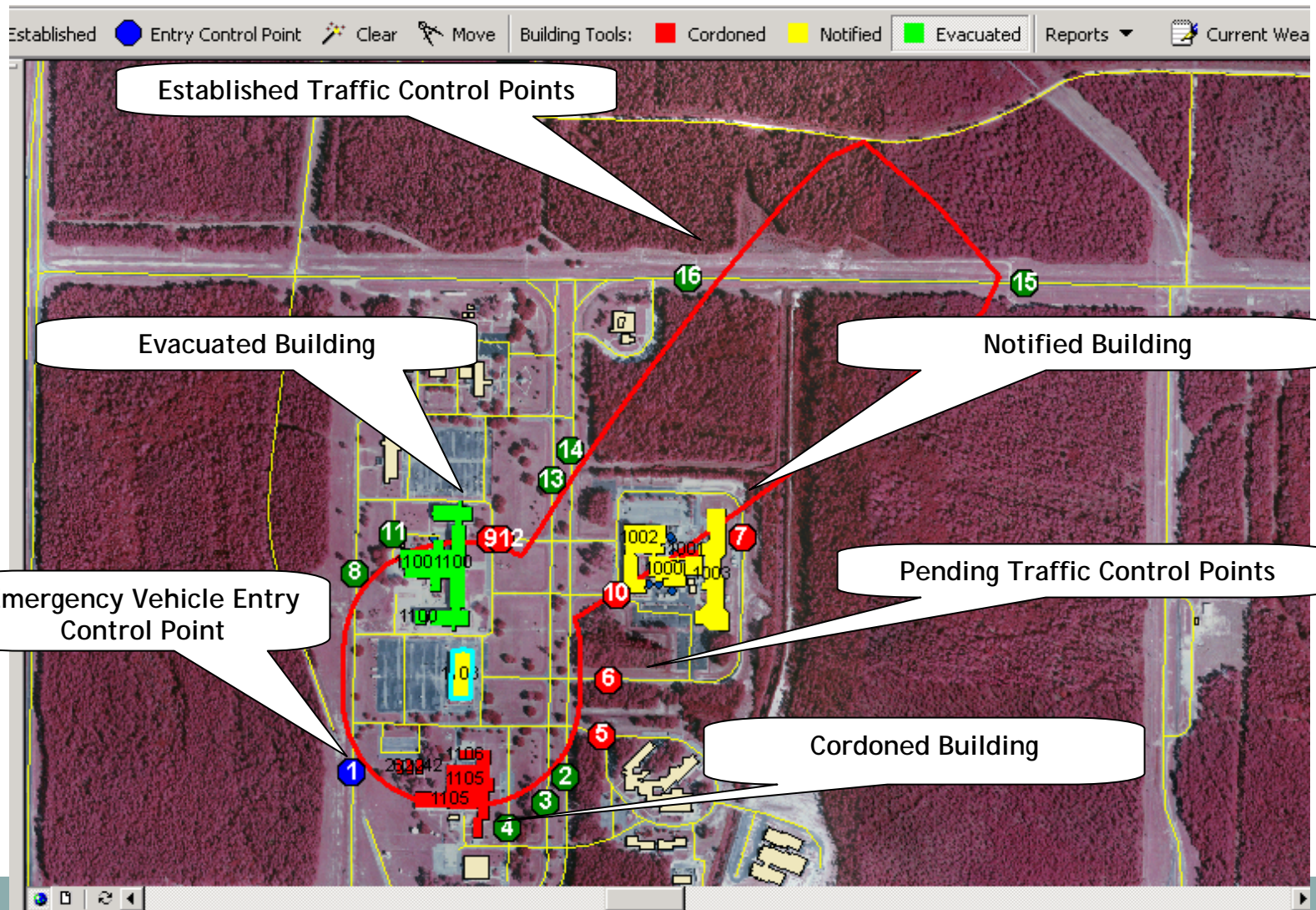


Natural Resource Management Team
SSC Cogon Grass Infestation: Total vs. Treated Areas to End of FY 2004
Date created October 29, 2004





Emergency Response



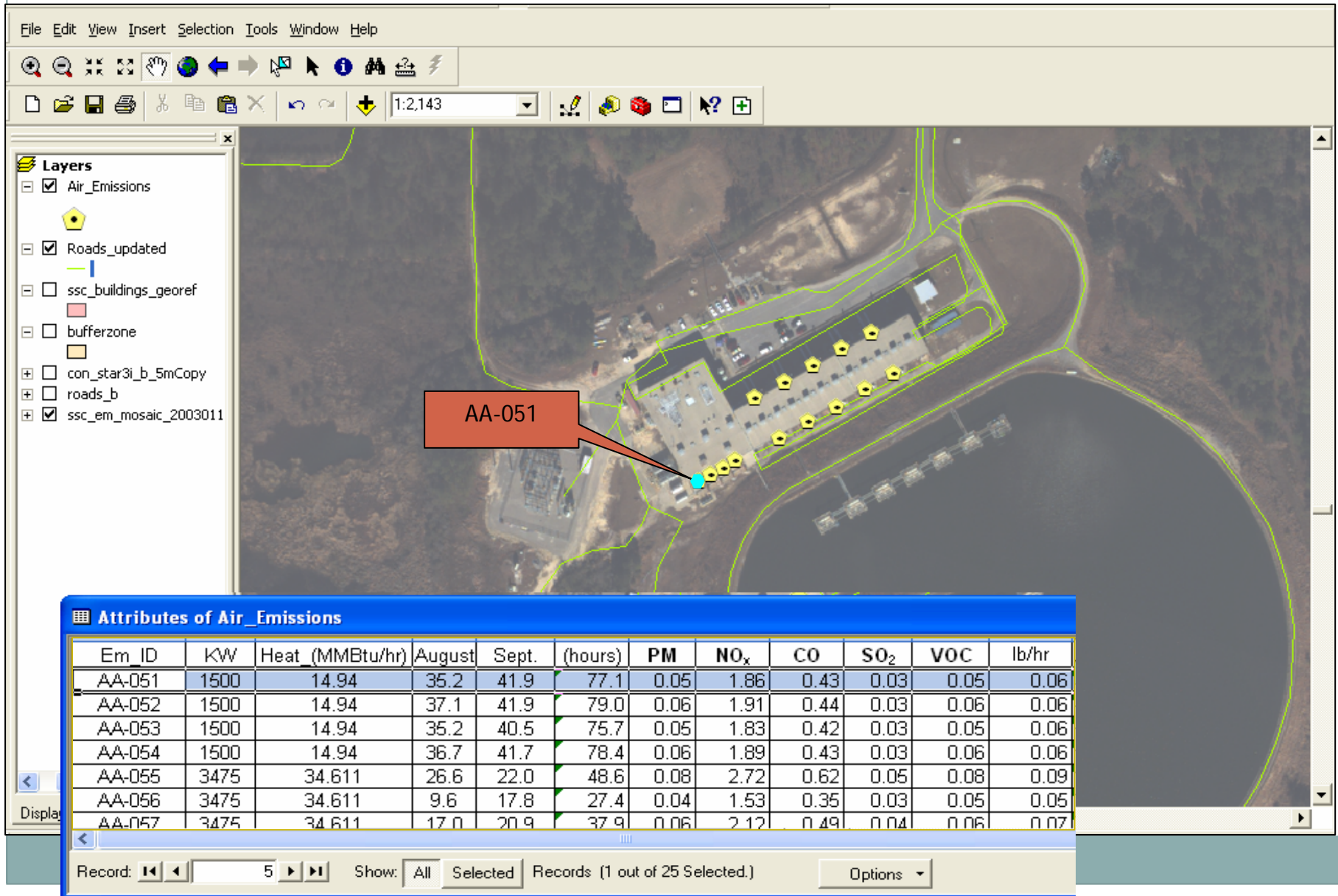


Environmental Assessments/Potential Impacts





Air Emission Sources



STENNIS: PRINCIPAL CENTER FOR HQ EGIS



Since 2000, Stennis has led NASA-wide effort to develop baseline EGIS for each of NASA's 14 field centers and component facilities - designed to support NASA's Environmental Management Program

NASA Headquarters designated Stennis Space Center as the Principal center for support of NASA's Environmental GIS (EGIS) activities.

Continued development of uniform datasets and Agency-wide applications for NASA's Environmental Management Program

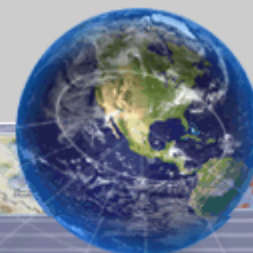
Today, each NASA Center has an EGIS database that serves as the foundation for applications development for both environmental and facilities management.





NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION
John C. Stennis Space Center

- + Visit NASA
- + Visit Destination Earth
- + Visit Stennis Space Center



EGIS PORTAL

Ames Research Center
Dryden Flight Research Center
Glenn Research Center
Glenn Research Center
Plum Brook Station
Goddard Space Flight Center
Jet Propulsion Laboratory
Johnson Space Center
Kennedy Space Center
Langley Research Center
Marshall Space Flight Center
Michoud Assembly Facility
Stennis Space Center
Wallops Flight Facility
White Sands Test Facility

Kennedy Space Center
KSC, FL 32899

ENVIRONMENTAL GEOGRAPHIC INFORMATION SYSTEM

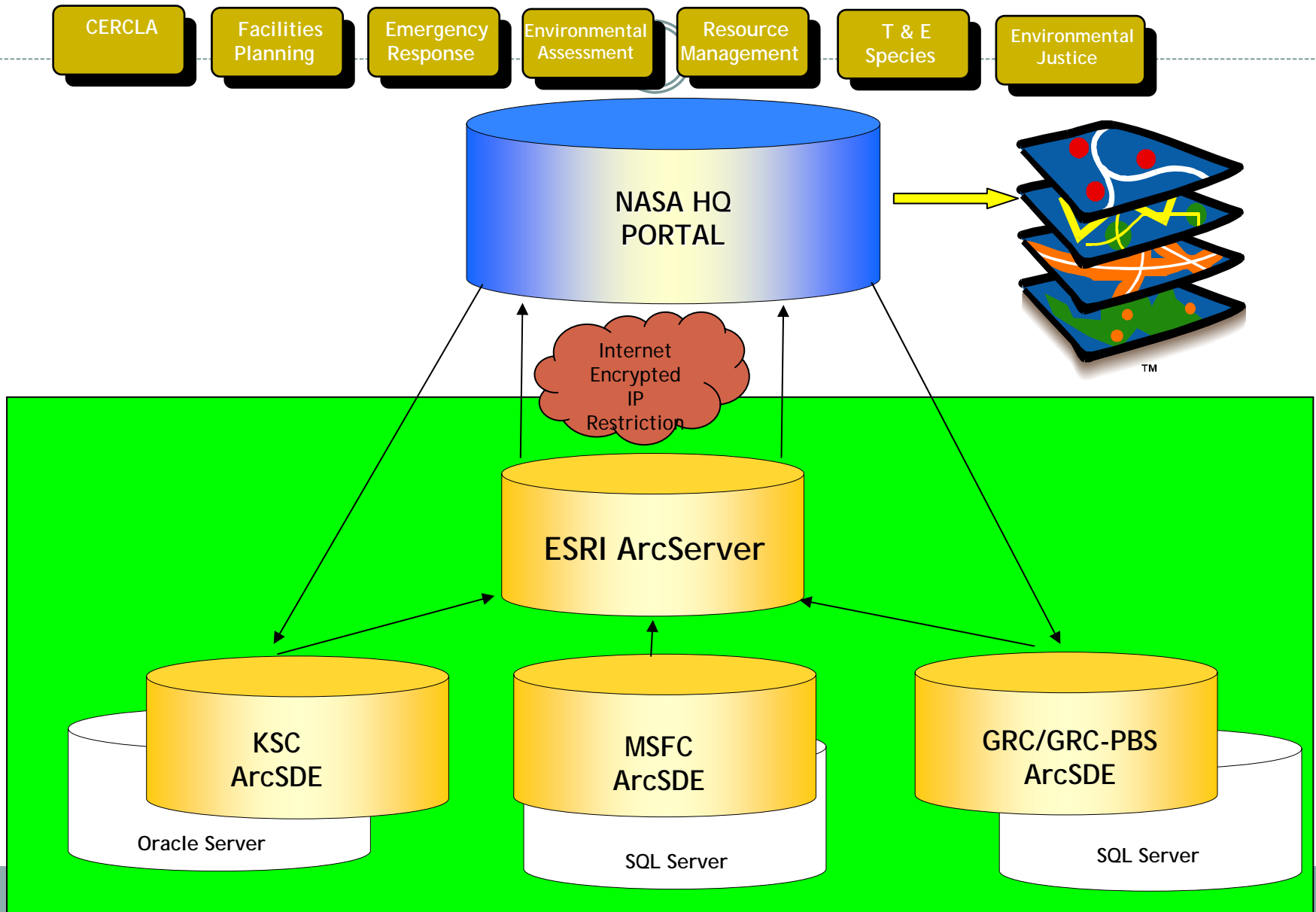


- + Freedom of Information Act
- + The President's Management Agenda
- + FY2001 Agency Performance Report
- + NASA Privacy Statement, Disclaimer, and Accessibility Certification
- + Freedom to Manage



NASA Official: Hugh Carr
Curator: Doc Smoot
+Contact SSC Environmental Office

SYSTEM ARCHITECTURE



Secure Login



- User Authentication


- Key FOB synchronization with SSC's Virtual Private Network (VPN)

- Username/Password protected


The screenshot shows the login interface for the EGIS Portal. At the top, there is a header bar with the NASA logo on the left, the text 'NATIONAL AERONAUTICS AND SPACE ADMINISTRATION John C. Stennis Space Center' in the center, and three links: '+ Visit NASA', '+ Visit Destination Earth', and '+ Visit Stennis Space Center' on the right. Below the header is a banner with the text 'EGIS PORTAL' on the left, a row of small map thumbnails in the center, and a large globe on the right. The main content area is a light gray rectangle containing a login box. Inside the box, the text 'SignIn to access the EGIS Portal:' is at the top. Below it are two input fields: 'UserID:' followed by a text box, and 'Password:' followed by a text box. Below the password field is a link that says 'Forgot My Password'. At the bottom right of the login box is a button labeled 'SignIn'. At the very bottom of the page, there is a dark blue footer bar with the text 'ENVIRONMENTAL GEOGRAPHIC INFORMATION SYSTEM' in white capital letters.




One Webpage = One Common Interface = One Standard Application

National Aeronautics
and Space Administration

Kennedy Space Center
Geographic Information System

Environmental

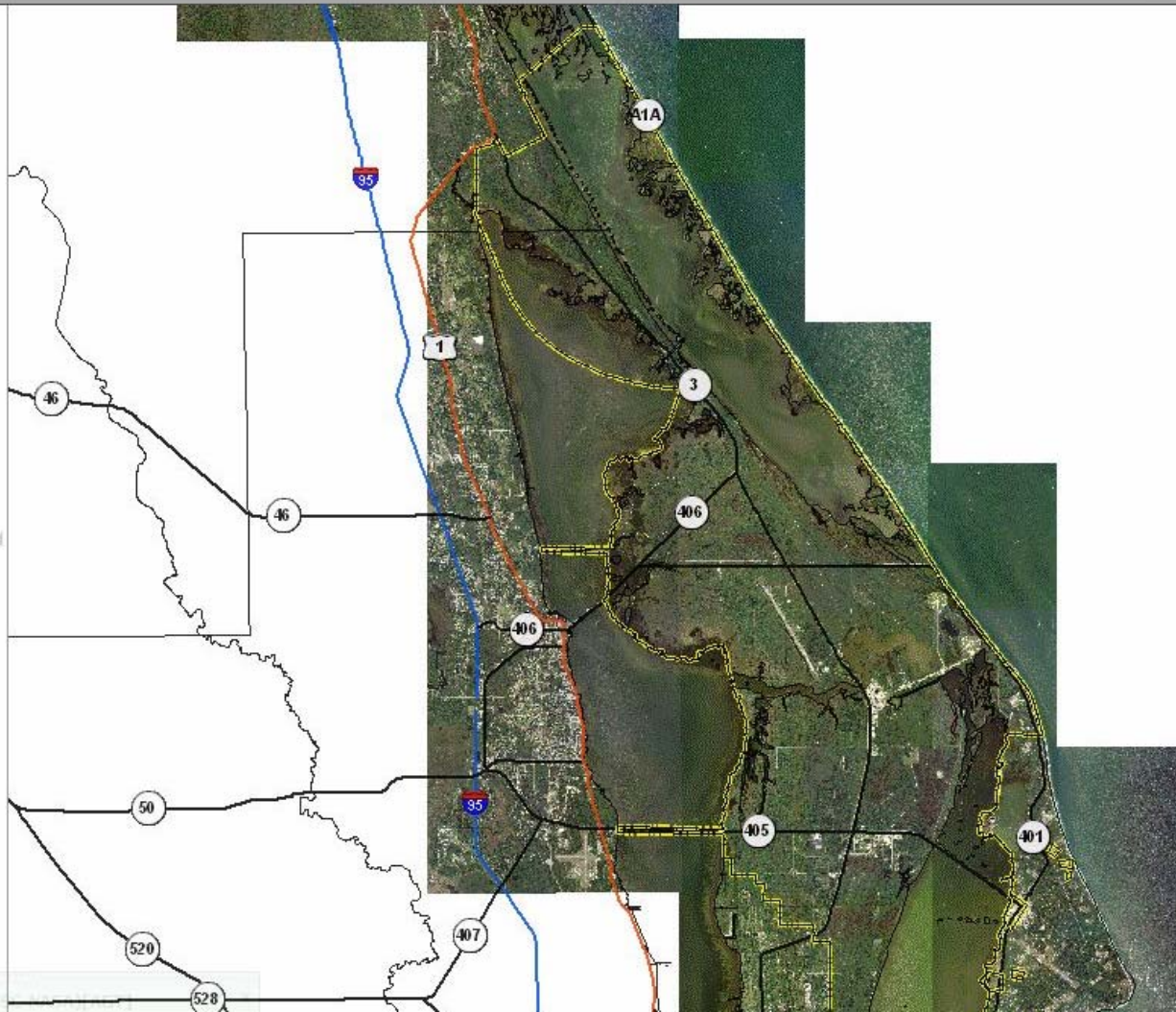
Kennedy Space Center Web Site



Tasks
Search Buildings

Results
Map Contents

☒ Kennedy/Vectors
☒ Kennedy/Imagery
☒ Ortho 2004 1 Meter



Murray, Adam W. (S)

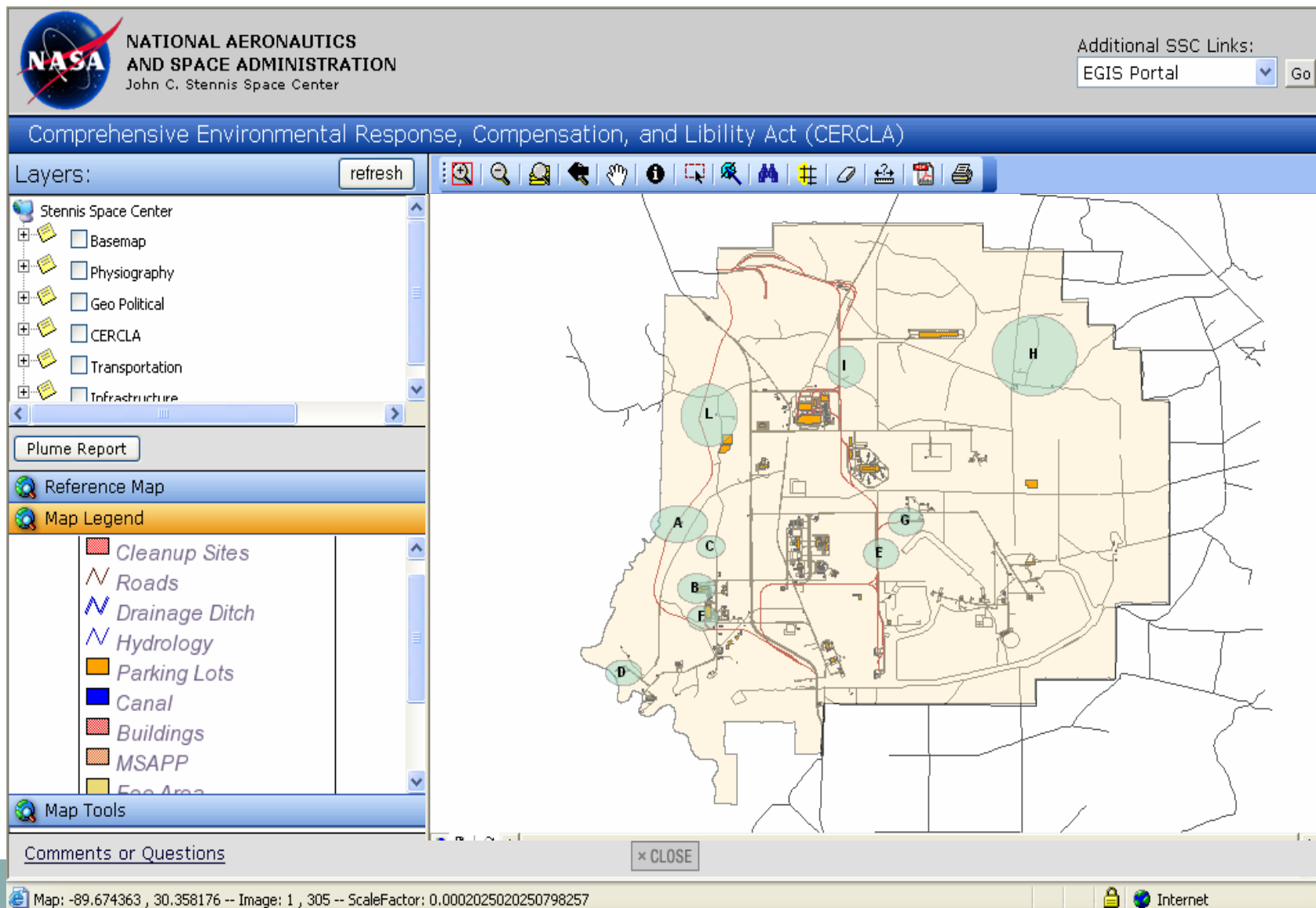
CERCLA GIS Web Portal

- Immediate access to SSC's clean up sites via Internet
- Facilitates reporting, compliance, site-assessment
- Dynamic 2-D maps, quarterly reports, analytical spreadsheets, site photos, EPA substance registry list, etc.
- Flexible, cost-effective
- 30+ year archival





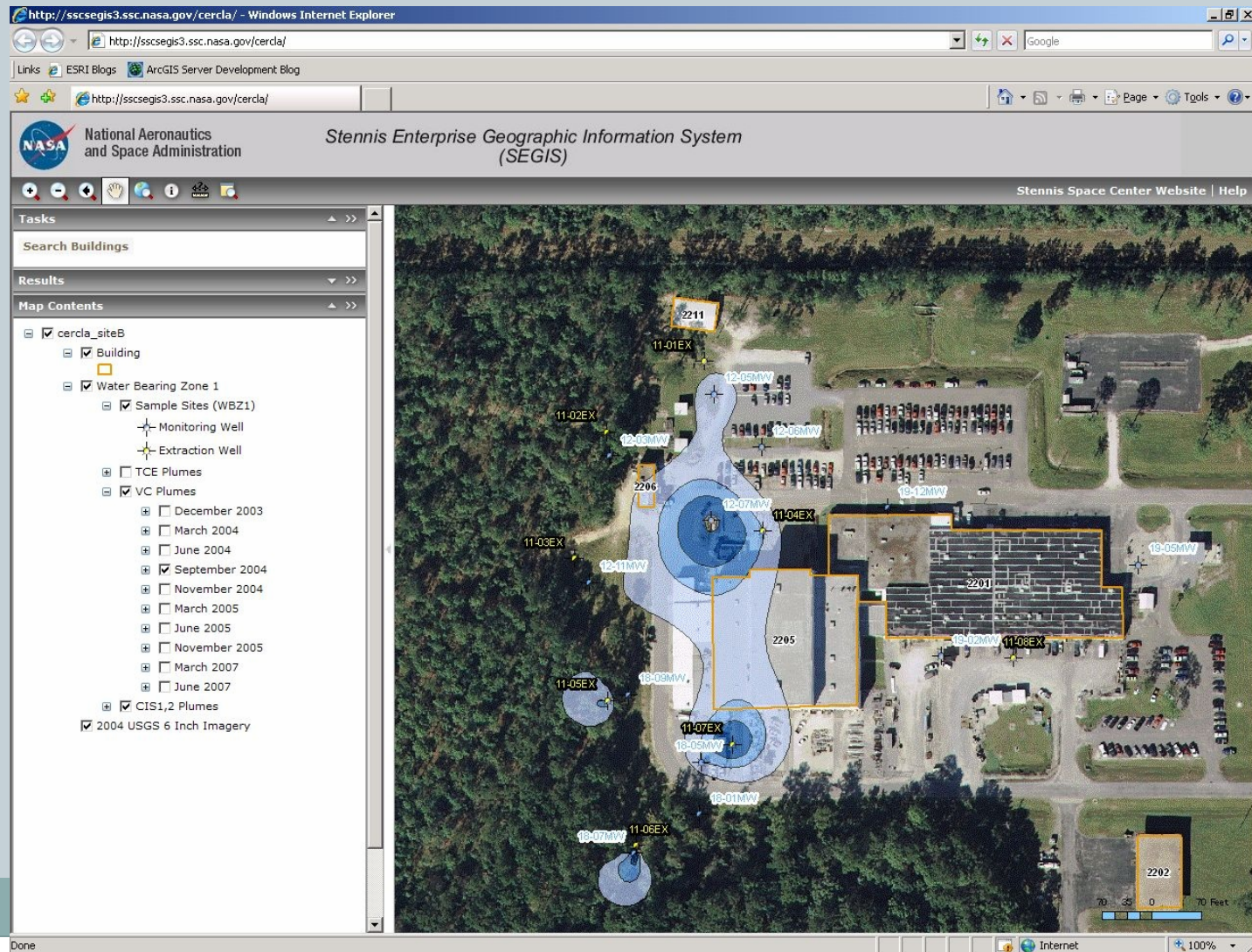
CERCLA Clean-Up Sites Stennis Space Center



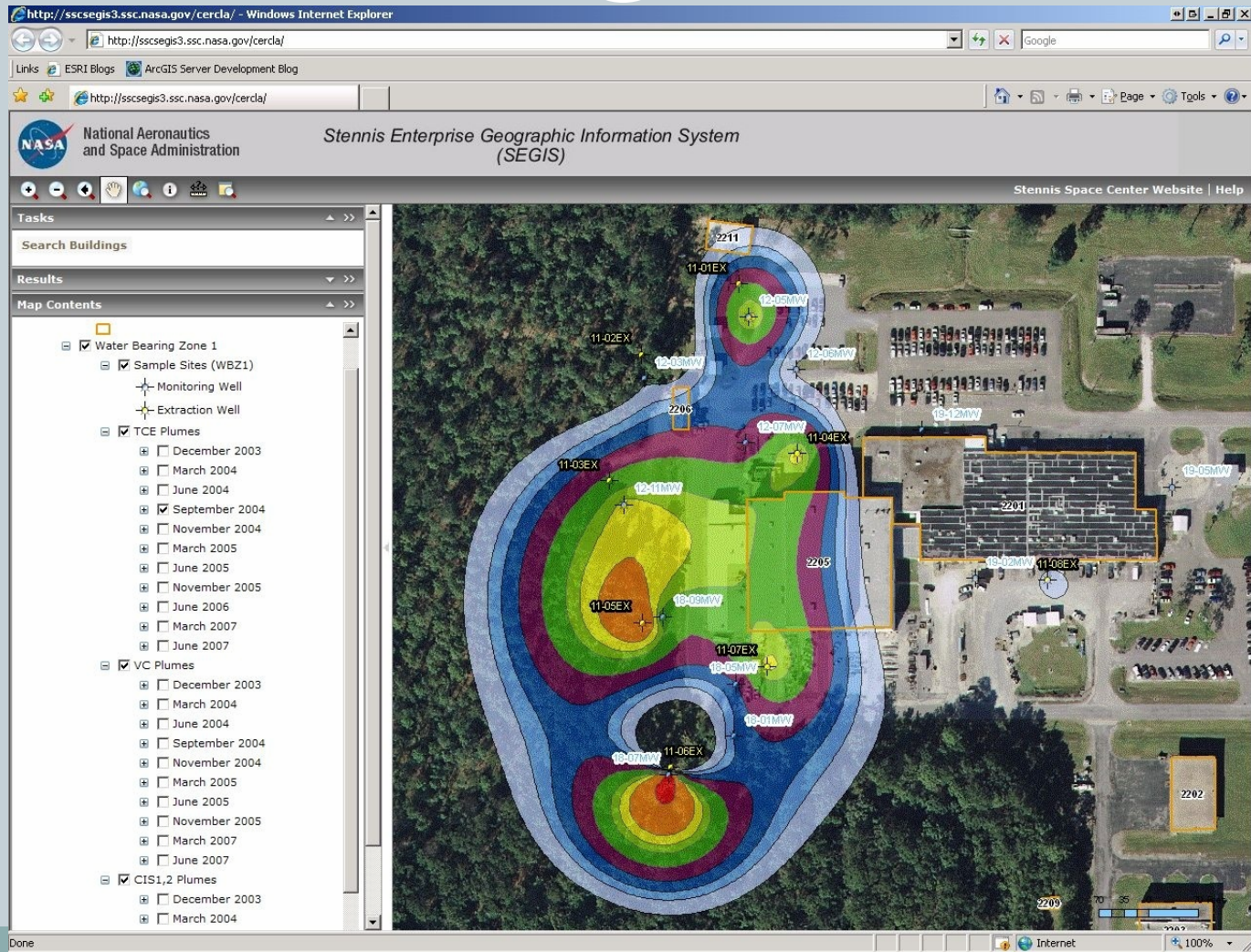


Multiple Search Capabilities

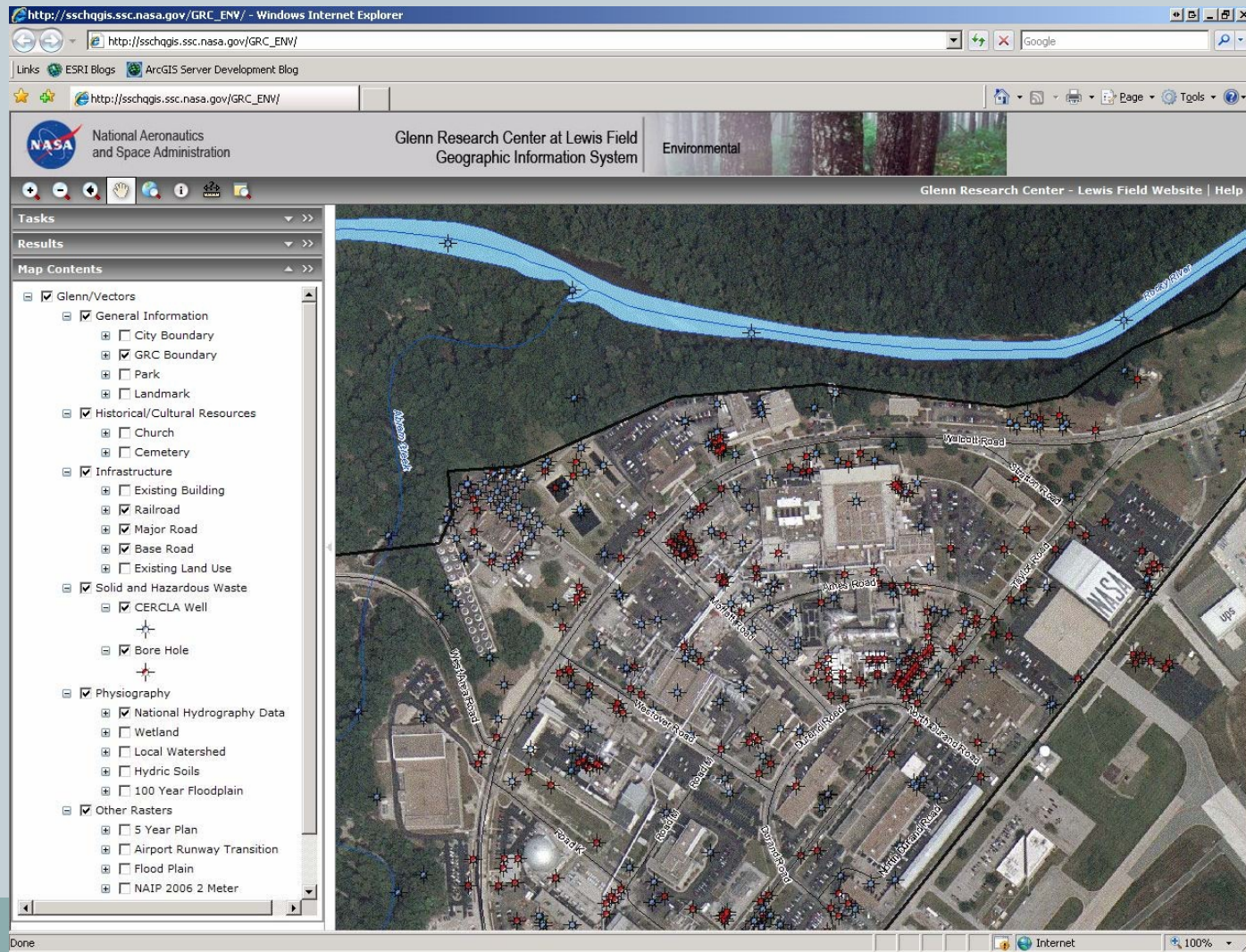
Monitoring Wells and Plumes



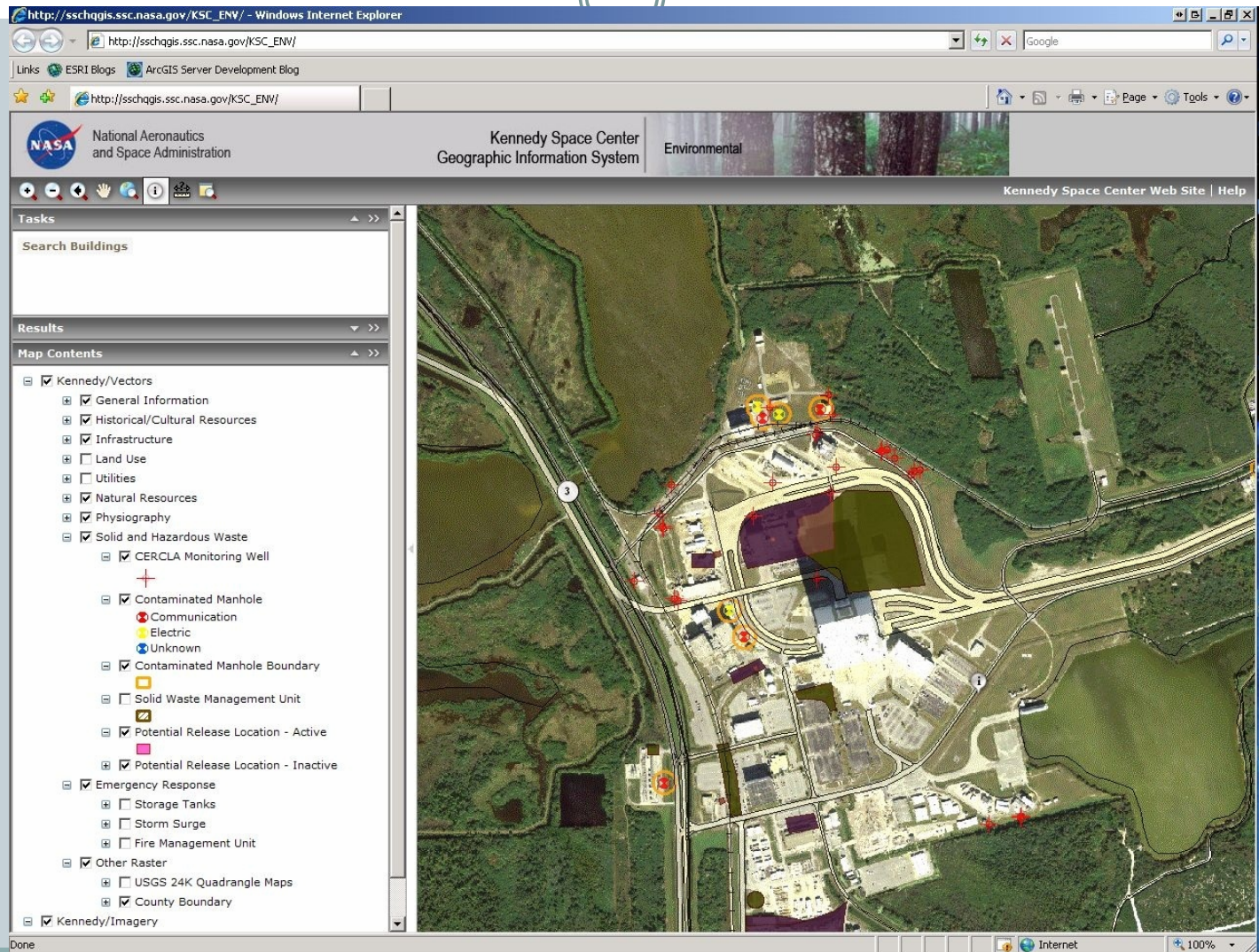
2D Plume



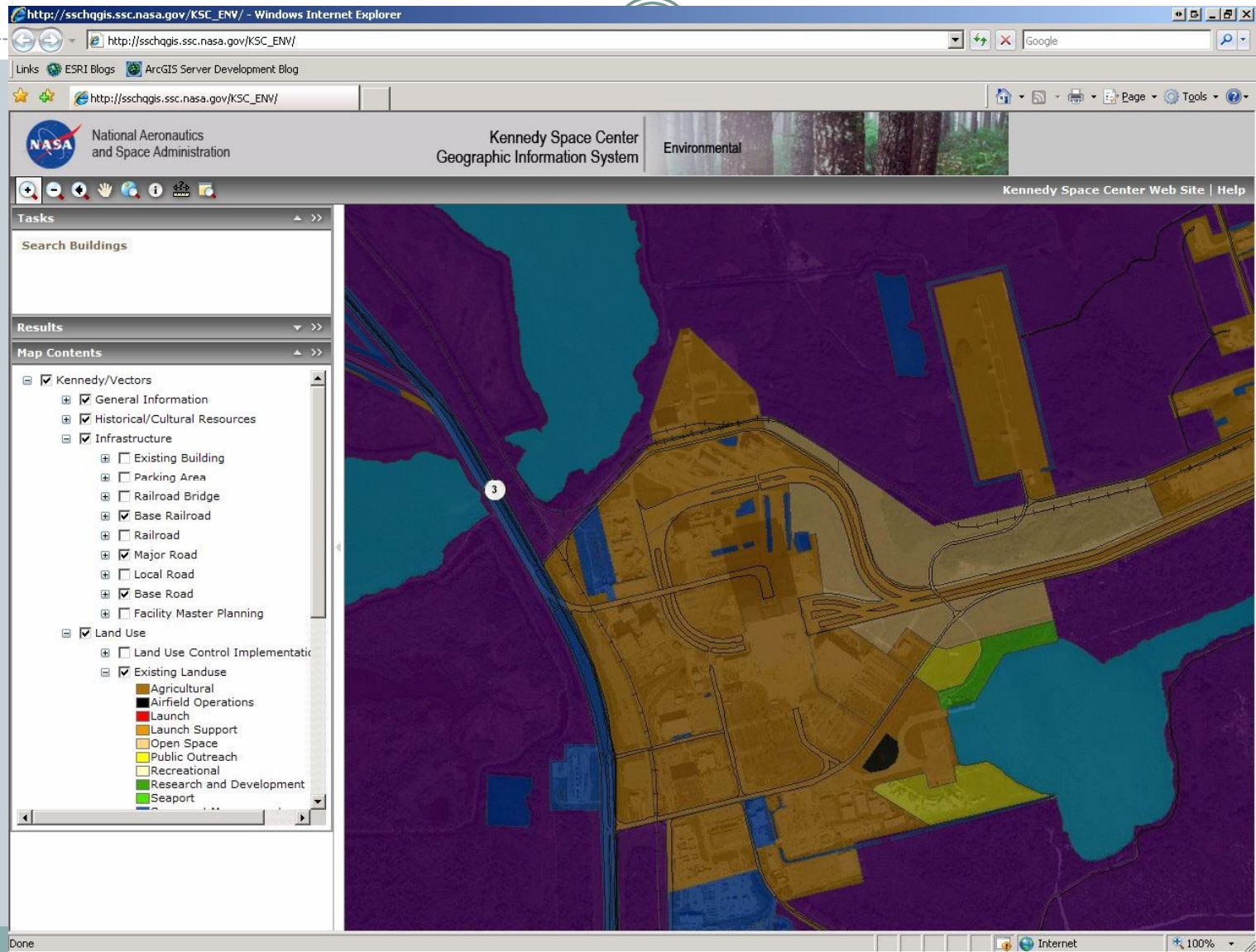
Solid and Hazardous Waste Sites Glenn Research Center



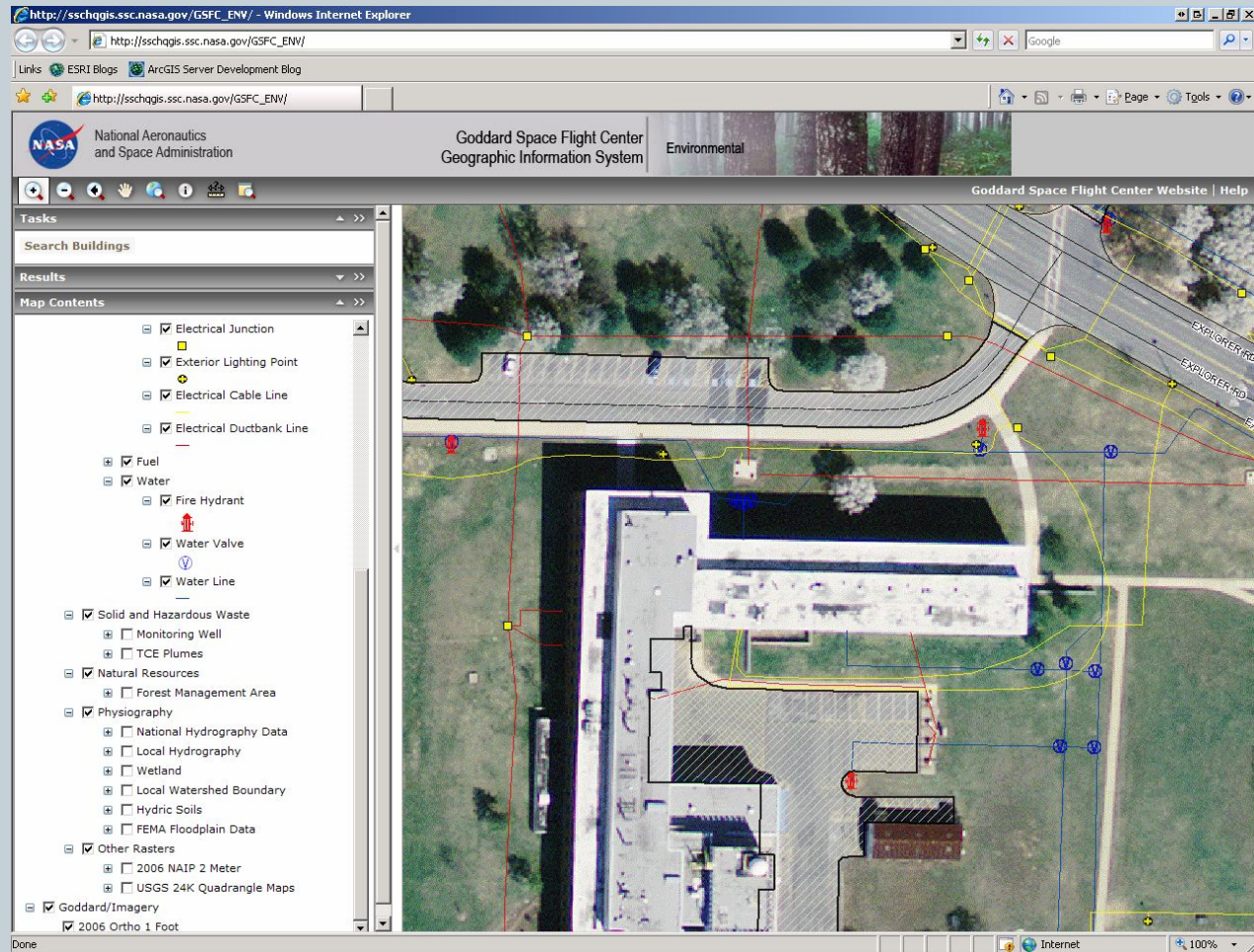
Monitoring Wells Potential Release Sites Kennedy Space Center



Land Use Planning Kennedy Space Center



Energy and Utilities Goddard Space Flight Center



Facility Master Planning

User Submits Query

-Show Built

-Show 5 Year CIP

-Show 20 Year CIP

-Show Floorplan

Attributes/Metadat

a



National Aeronautics
and Space Administration

Headquarters Level Master Plan GIS



Room Statistics

Building M12, Room 3040B, Campus Mountain View

[Occupant Information](#)

| | | | |
|--------------|-------------------|--------------------|-------------|
| Division | 1300 Legal & CAO | Space Type | Open Office |
| Area VP | Harold Smith | Executive Gross SF | 100 |
| Area Name | 7300 Facilities X | Net SF | 80 |
| Area Number | 7390 | Max Occupancy | 1 |
| Area Manager | Mary Clare Smith | Current Occupancy | 1 |

Beyond Environmental GIS (EGIS) to Enterprise GIS (SEGIS)



Contact



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